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1960

## The Bobbin and Beaker Vol. 17 No. 3

Clemson University

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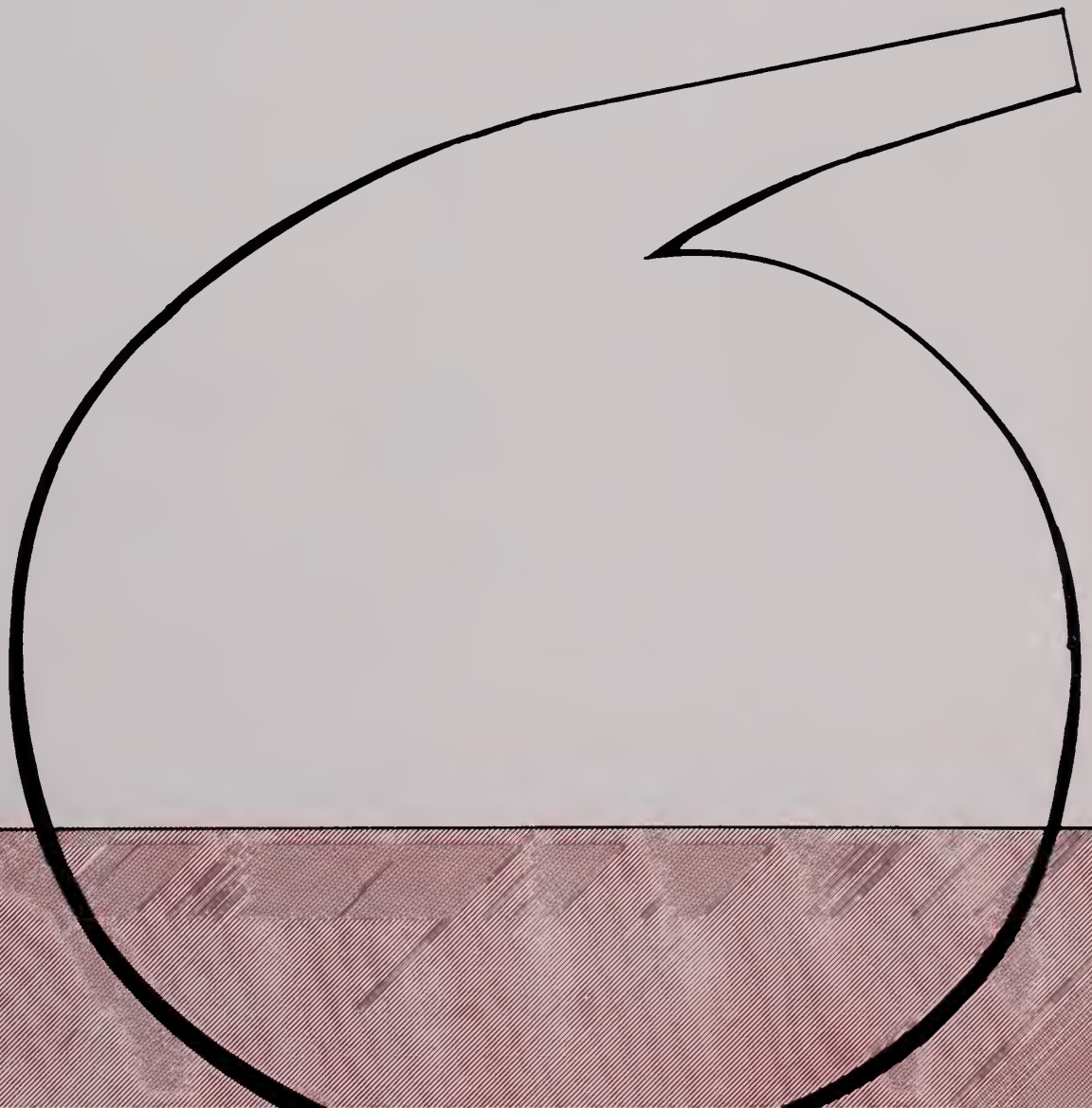
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**SPRING 1960**

# **Bobbin & Beaker**



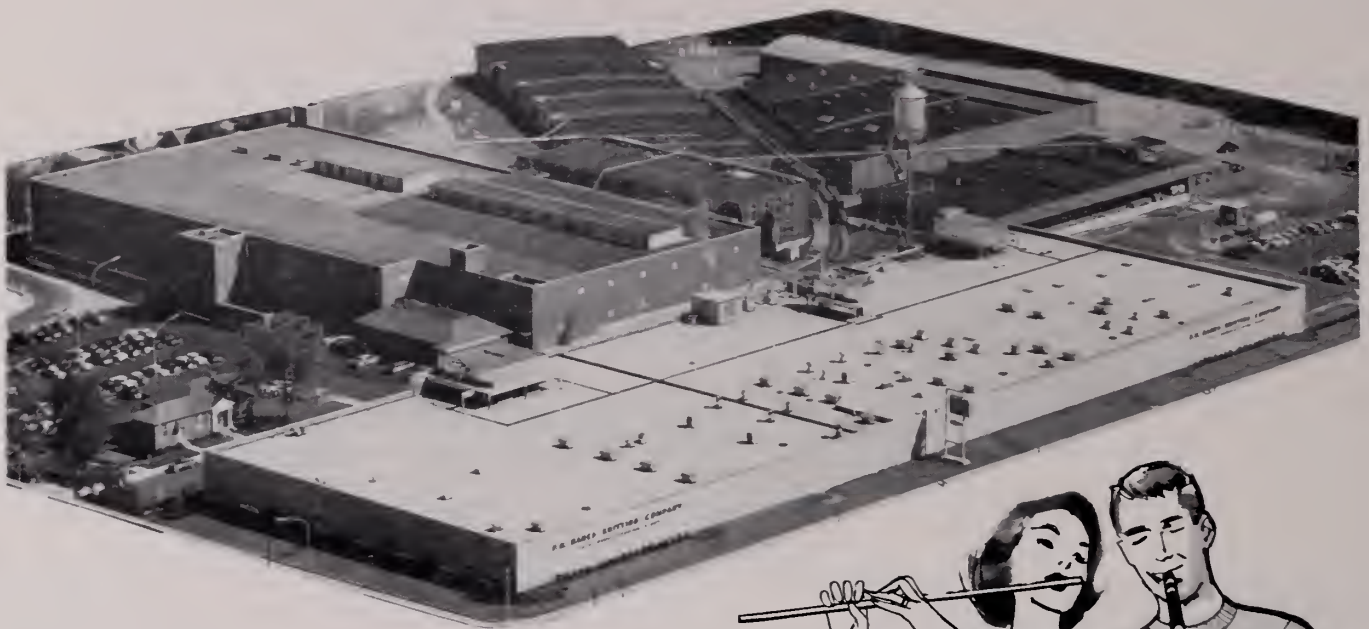


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**HANES**

*Knitwear for the family*



When the P. H. Hanes Knitting Company faced the problem of increasing production to meet the growing demand for their "Knitwear for the Family," Robert and Company Associates were called on to make a thorough study of Hanes' present facilities. Finding existing facilities inadequate for additional production, a new plant adjacent to Hanes' yarn mill in Winston-Salem was recommended.

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If your plans call for increased productivity and efficiency, draw on Robert and Company Associates' 42 years of experience in serving the great names of the textile industry.



**ROBERT AND COMPANY  
ASSOCIATES**  
Textile Engineering Division  
ATLANTA

# THE Bobbin & Beaker

Official Student Publication  
Clemson Textile School

VOL. 17

SPRING ISSUE

NO. 3, 1960

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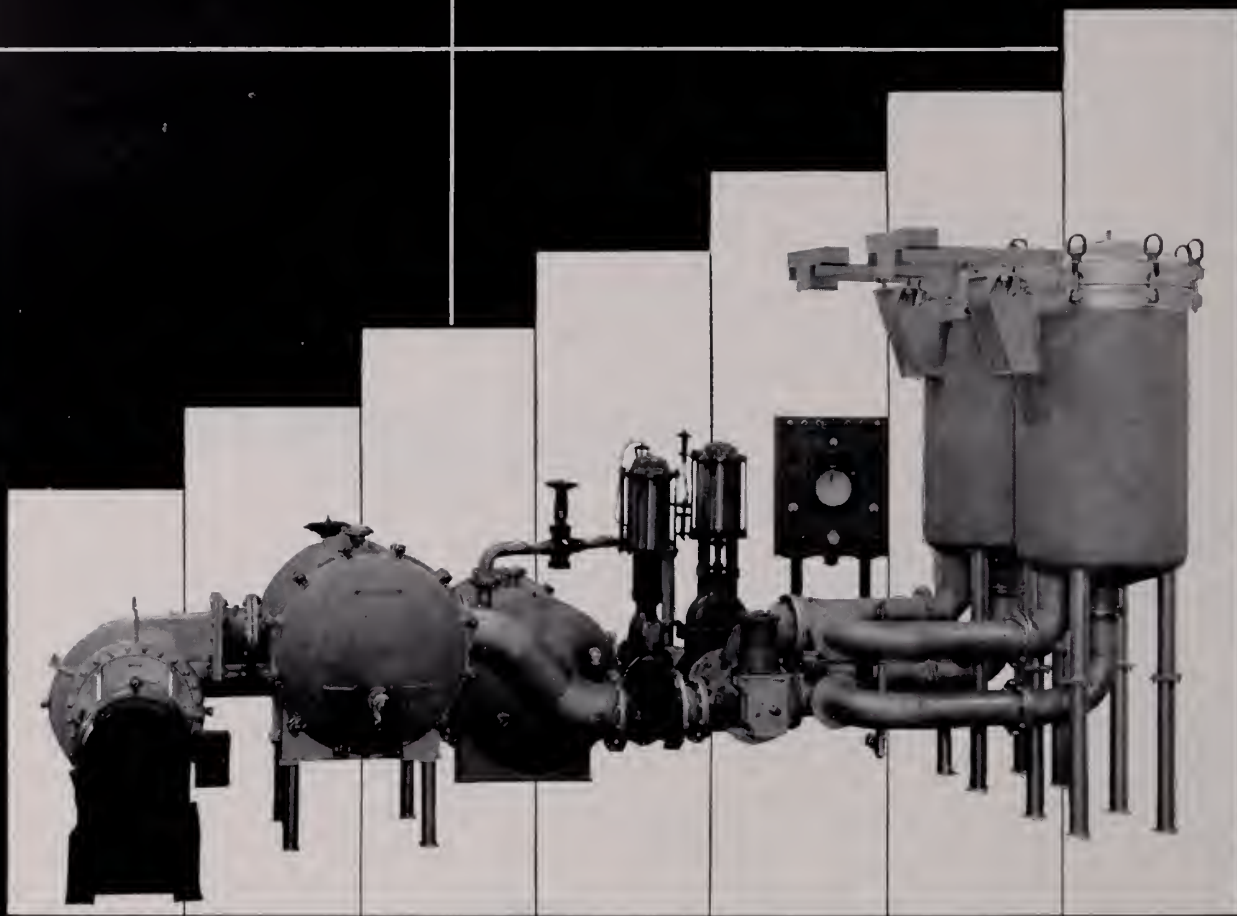
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# OPERATING PRINCIPLES *of Static Pressure Dryers*



## OPERATING PRINCIPLE OF STATIC PRESSURE DRYERS

Without static pressure a yarn dryer must operate at atmospheric (approx. 15 PSIA) or **one atmosphere**.

A 150 HP blower operating at full H.P. load has an inlet capacity of 4000 CFM. When operating at **one atmosphere** and 280°F such a blower will handle 250 lbs. per minute, by weight, of saturated air containing a maximum of 8000 B.T.U.

A static pressure dryer requires an average of 100 HP when operated at 5 **atmospheres** (75 PSIA) and has an inlet capacity of 4000 CFM. If operated at 280°F, the blower will handle 5 times the weight of saturated air or 1,250 lbs. per minute containing a total of 40,000 B.T.U.

Drying is the process of evaporating moisture by heat. The static pressure dryer is more efficient since it provides 5 times the B.T.U. with 33⅓ per cent less power consumption.

**Fast dryers without static pressure** are available. An interview with one of our experienced sales engineers will help you decide which type of drying is best for your needs.

## Gaston County Dyeing Machine Co.

WORLD'S LARGEST PRODUCER OF PRESSURE DYEING & DRYING MACHINERY  
STANLEY, N. C., U.S.A.

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The Rudel Machinery Co., Ltd.  
614 St. James Street, W., Montreal  
260 Fleet St., E., Toronto

# from the Editor



This issue of the "Bobbin & Beaker" is the last prepared by the current staff. We hope our publication has been of much interest and use to the textile industry. The new staff will be headed by Tommy Ariail the present Managing Editor.

This issue features articles on textile chemistry and textile machinery. The Dean's column contains information on the short summer courses at Clemson for men of the textile industry.



The 1959-60 Bobbin and Beaker staff seated from left to right: Gordon Ferguson, Advertising Manager; Samuel H. Fleming, Circulation Manager; Charles Bagwell, Business Manager; Tommy Ariail, Managing Editor; standing, Alan Bell, Editor.



# Spectrophotometric and Colorimetric Transmittance Determinations Of Dye Solutions

By: J. D. Turner  
Technician Chemist, Development Section  
Excelsior Finishing Plant

The use of color measuring instruments is becoming more common in our dyeing and finishing plants. One of the apparent reasons for their usage is that the determinations are carried out by using established procedures involving simple calculations and requiring no knowledge of the theory involved. The results are accurate, dependable, and reproducible.

There are many practical applications for the spectrophotometer and the colorimeter in a dye house. Some of the applications related to dyestuffs are (a) analysis of dye shipments for strength uniformity, (b) evaluation of new dyestuffs, and (c) determination of dye exhaustion rates.

In most cases the dyestuff as received at the plant is not pure but is diluted with a given amount of soluble material. Of course, if the amount of these diluents is varied between shipments, then the concentration of the dye will change. If the concentration of the new dye shipment varies, for instance, 15% from the previous shipments, it will affect the dye formulas that have been standardized to the concentration of previous shipments. For this reason it is necessary that we know the concentration of each dye shipment that arrives at the plant.

Dye stuff strength determinations are made in the following manner. Most color measuring instruments read from 0 to 100% transmittancy on a linear scale. To compare the relative strength of two identical dyes, one must obtain the transmittance reading at the maximum absorption point and then convert this value to optical density. The optical density is the logarithm of 1 over the transmittancy. For instance, if one solution transmits 40% and another 45%, the former will have an optical density of .39794 and the latter of .34674. Their strength would be in this ratio. In this case the first dyestuff would be 12.87% stronger than the latter. Thus a corresponding change will have to be made in the dyeing formula to compensate for the dye strength difference.

There are instances where a given dyestuff is sold by several manufacturers. In addition the strength of the dye may vary between these manufacturers. Therefore the dyestuff buyer is constantly seeking those dyes, which offer the most money value, maximum color value and performance at minimum cost.

In order to compare two dyes, a spectrophotometer curve must be made of each dye. A spectrophotometric or photometric curve is a plot of the percent reflectance or transmittance of a sample at various wavelengths. Daylight or ordinary artificial light is made up of all the colors of the spectrum. The visible spectrum begins at the ultraviolet region and runs through blue, green, yellow, orange, and red colors and ends at the infrared region. The visible spectrum does not have any very definite limits. However, it is generally assumed to extend through the wave length range from 400 to 700 millimicrons. Light of 400 millimicrons is blue and 700 millimicrons is red. A substance appears to be a certain color because it reflects or transmits color of that wavelengths. A red dye solution would transmit red light and absorb most of the other colors.

The curve shapes are independent of concentration; therefore two curves can easily be compared for shade by superimposing them. If the curves of two dyes can be superimposed, then they are identical colors and are said to be prototypes of each other. If two dyes are prototypes, they may then be compared with regard to strength. No attempt should be made to compare two dye solutions for strength unless they are the same prototype and are chemically similar.

However, it has been pointed out that the analysis of dye in solution should be performed with care since the following variables may affect the results. First, there may be variations in dye performance due to difference in exhaustion between the dyes; second, there may be differences in dye selectivity

or ability to dye fibers evenly; third, there may be a slight shade difference within commercial tolerance which, nevertheless, might be interpreted as a strength difference; and fourth, dyes compounded with different diluents may appear to differ in strength.

The rate at which dyes exhaust may be determined colorimetrically by taking samples of the dye bath at different intervals during the dyeing and determining the relative strength loss as discussed previously. In this work variables affecting dye exhaustion such as temperature, time, and pH must be controlled.

Conditioning of dye samples is very important when conducting quantitative tests. Care must be taken to be sure the dye solutions are stable. Dyes may be sensitive to conditions which if ignored will lead to incorrect results. Some of the most important factors to be considered are as follows: (1) **pH.** Many dyes are sensitive to pH and consequently it is wise to buffer all dye solutions to the most stable pH. (2) **Trace metals in water.** Some dyes are very sensitive to small amounts of copper and iron; therefore distilled water should be used. (3) **Temperature.** Some dyes are temperature sensitive and should be controlled to  $\pm 1^{\circ}\text{C}$ . (4) **Light.** Some dyes will change

if exposed to light for long periods of time. Such dyes might be kept out of the light or irradiated by exposure to strong light for a short time. This condition will weaken the dye to a stable end point.

(5) **Plating out on glass cells.** Some of the basic dyes tend to plate out on the instrument cells. Compensation can be made for this by plating the cells before the samples are run. Usually, only a small constant percentage of the dye will plate out. (6) **Time.** Some dyes change, usually weaken, if they are allowed to stand. Such dyes should be analyzed immediately after the solutions are prepared. In a few cases it has been found best to allow dye solutions to stand for a fixed time before analyzing to insure reproducible results. (7) **Sample size.** When preparing dye samples for solution analysis, sufficient amounts should be taken to insure that the sample is representative since most of the dyes are heterogeneously mixed with diluents.

There are only a few of the common applications of spectrophotometry and colorimetry and some of the factors to consider in their determinations. The spectrophotometer and colorimeter are recognized as useful tools in the textile industry. They have a very versatile applications and new uses are being discovered as progress continues.

## EXCELSIOR FINISHING PLANT

Pendleton, South Carolina



Finishers of Some of the World's Finest  
Woolens, Worsted and Synthetic Blends  
Used in Outer Wear Apparel



# CIBACRON DYES

Dyes Division  
CIBA COMPANY, INC.

The impact of color on twentieth century living has been felt more keenly than at any other time in man's history. The use of color and its application to every day living has increased a hundredfold. Dye manufacturers are constantly striving for brighter dyes possessing greater fastness properties.

CIBA research has produced a range of dyes that at the same time achieve brilliance with greatly improved fastness. This range of dyes presents an entirely new departure in the dyeing of cellulosic fibers. The range is known as the

## CIBACRON DYES

The Cibacron dyes show an improved appearance over previous dyes which were substantive to cellulosic fibers in that they are brilliant. They show a longer wear-life, that is, exceptional fastness because of a chemical linkage between the fiber and the dye. These two features set the Cibacron dyes apart from all previous dyes.

The Cibacron embody an entirely new chemical principle. They place the dyeing of cellulosic fibers on a completely new foundation. These dyes comprise a complete range of shades, applicable by dyeing or printing methods, which are simply applicable by conventional dyeing procedures for cellulosic fibers.

When conventional dyes are applied by the conventional procedures now used for cellulosic fibers, the dye is either absorbed on to the fiber or mechanically fixed to the fiber. Neither way yields a dyeing which exhibits optimum wash fastness. To obtain a dyeing with optimum wash fastness a dye must be available that is capable of forming a stable chemical bond with the fiber. The first attempts to synthesize such a dye were made over fifty years ago. Thirty years ago CIBA succeeded in synthesizing dyes which possessed suitable reactive groups. At this time there was no practical method to apply

these dyes to the fiber. Then Imperial Chemical Industries developed their "Procion" dyes which can be fixed to the fiber by direct chemical linkage, and by a somewhat different approach CIBA produced the Cibacron dyes which form a chemical bond with the cellulosic fiber.

The Cibacron dyes are water soluble acid dyes with practically no affinity for cellulosic fibers. They contain a reactive group which combines with the hydroxyl groups of the cellulose molecule. The reactivity is such that in aqueous non-alkaline solution, the dyes remain unchanged for long periods of time. A chemical reaction with the fiber occurs only at high temperatures (160-212°F.) and in the presence of alkali.

The reaction with the fiber is accompanied by a side reaction in which the active group is inactivated in the presence of water and alkali. The portion of dye which is inactivated cannot react with the fiber and must be removed. This is readily done since the Cibacron dyes are highly soluble in water.

Since the Cibacron dyes are linked to the fiber permanently, they cannot be removed from the fiber by solvents, laundered off the fiber or rubbed off the fiber. Any dye so removed is removed together with the fiber. Although Cibacron dyeings possess very high fastness properties, they can be stripped for re-dyeing by treatments involving oxidation or reduction, or a combination of both. Should, for some reason, the finished dyeing not be on shade, it is possible to correct by shading.

It may be thought since the mechanics of dyeing for the Cibacron dyes is fundamentally different from that of all other dyes, that special dyeing equipment would be necessary for their application. This is not so—no special equipment is necessary. The conventional machinery found in any well equipped mill can be used. Pad dyeing equipment, batch dyeing and continuous dyeing equipment are particularly suited for the application of the Cibacrons. Modern piece-dyeing units require no modification.

Since, in the absence of electrolytes, Cibacrons have practically no affinity for cellulosic fibers they

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\*CIBACRONS—Registered Trade Mark by Ciba Company, Inc.

are ideal padding colors. Tailing, with such products is reduced to a minimum and any type padding mangle giving a uniform squeeze can be used. Immersion time can be increased for cloth with low absorbency.

The Cibacron dyes are essentially padding dyes and in addition to printing are applied by the Pad-jig method, the Pad-steam method, the Single-pad/steam method and the Pad-thermo-fixation method. The Pad-jig and Pad/thermo-fixation methods are generally used for small to medium sized batches whereas the Pad-steam methods are used primarily for larger batches. A short general description of these padding procedures will be given to familiarize the reader with the important features of each.

#### **Pad-jig method**

The material is padded through a padding liquor containing only dye. It is dried and passed into a jig containing the proper concentration and type of alkali. The material is given at least four ends over a period of at least 30 minutes. The loose color is removed with a hot rinse, soaped at the boil and then rinsed hot and cold.

#### **Pad-steam method**

The material is padded through a padding liquor containing only dye. It is dried and padded through a padding liquor containing caustic soda and common salt. Fixation is effected by steam for 30-60 seconds, followed by rinsing, soaping and rinsing.

#### **Single-pad/steam method**

This method differs essentially from the Pad-steam method in that the dye and chemicals are padded simultaneously and the steaming time is somewhat longer. The material is padded through a padding liquor containing dye and alkali. It is then dried and fixation effected by steam for 5-8 minutes. This step is followed by rinsing, soaping and rinsing.

#### **Pad/thermo-fixation method**

This method differs from the Pad-steam methods in that fixation is accomplished with dry heat rather than with steam. The material is padded through a padding liquor containing dye and alkali. It is then dried and thermo-fixed in dry heat for 5 minutes, at 320°F. The goods are then rinsed, soaped and rinsed.

In the field of printing a remarkable step forward has been achieved with the introduction of the Cibacron dyes. They lend themselves to conventional and emulsion methods of printing. The scope for printed patterns is now practically unlimited and because of the brightness and the high fastness of the Cibacron dyes, the printer is presented with a means

of extending his range of available bright colors possessing outstanding fastness properties.

Compared with conventional methods of printing, the processes used in applying Cibacron dyes offer a number of advantages: 1. The preparation of the printing pastes is simple. 2. Cibacron printing pastes are stable almost indefinitely. 3. Prints produced with Cibacron dyes can be stored for indefinite periods without detriment, both before and after steaming. 4. Cibacron dyes are miscible with one another in all proportions. 5. Application of Cibacron dyes presents no difficulties in either roller or screen printing. 6. Cibacron dyes can be printed alongside dyes of all other classes (except where development is effected by an acid treatment). 7. Cibacron dyes can be used for discharge and resist printing.

Briefly stated the print paste contains dye, urea, thickener and alkali. The material is printed, dried, fixed with steam or dry heat, rinsed cold, rinsed hot, soaped at the boil, rinsed hot and rinsed cold.

In addition to the advantages which the Cibacron dyes offer over conventional printing, they have opened an entirely new concept in the field of printing—Trichromatic Printing. Extensive development work on these new dyes has led to the establishment of a new field in roller printing.

In the field of paper printing any original can be faithfully reproduced in color. In the field of textile printing it has not yet been possible, as a rule, to reproduce areas of graded color-tone or continuous-tone mixtures with conventional roller engravings. With Cibacron dyes and three rollers it is possible to produce a wide range of multi-colored objects. The field of paper printing uses as its primary colors a yellow, a red and a blue—in Trichromatic Printing on textiles there is no restriction on the primary shades used as components. Because of this, extremely attractive and well balanced color effects can be obtained.

Color separation of an original can now be transferred to three rollers by a process utilizing half-tone dot screens, color filters and cross line screens. In the sequential printing of the individual rollers on the textile material, the minute dots are not superimposed but placed closely side by side and so appear to the eye to merge into the original colored image. The Cibacron dyes possess special advantages, which make them especially suitable for printing from such tone-printing rollers and which make them distinctly superior to all other classes of dyes: 1. Cibacron dyes have good flow characteristics. 2. Even with consistent print pastes there is very little color transfer. 3. There is no clogging of engravings. 4. There is unlimited scope for mixture shades in fall-ons. 5. The colors are fully visible during printing. 6. The Cibacron dyes give good coverage and smooth



level tones. 7. Even the shallowest engravings and the finest half-tone grounds print with perfect clarity of mark.

It is essential that an emulsion thickener be used for Trichromatic Printing to ensure perfect clarity of mark from the shallowest etchings which, in turn, ensure strong, brilliant compound shades in uniform gradation of depth. Sodium alginate thickeners clog the finest parts of the engravings and make the mixtures appear rough and skittery because the minute dots cannot merge into one another.

Trichromatic Printing yields more attractive designs and brings patterns to life with the aid of even, dark and light tones. Mixtures of yellow, orange, brown and green tones with reds of a yellow and a blue cast or with blues of a green and red cast and with black, produce color contrasts never before achieved. Trichromatic Printing with Cibacron dyes is primarily suited to fashion styles, dress goods, blouse materials and squares.

The Cibacron dyes can also be package dyed, stock dyed and skein dyed.

Recent experiences have shown that the Cibacron dyes are not only applicable to cellulosic fibers but also to wool—by printing and by dyeing. After ex-

tensive laboratory experiments and plant trials CIBA has succeeded in developing a simple method of applying Cibacron dyes to wool.

Cibacron dyes on wool yield very fast, level dyeings of high tinctorial strength. Never before has it been possible to obtain wool dyeings which combine the brilliance and fastness of those prepared using Cibacrons.

Because of their brilliance and fastness the Cibacron series of dyes has found an extremely varied field of application. The following list includes just a few of the many end uses of Cibacron dyed material.

Bright Fashion Shades on Cotton Pieces

Terry Towelling

Linen Fabrics Used for Furnishings and Clothing  
Corduroy

Viscose Rayon Damask

Bed Linen

Chemically fixed dyes are a significant departure from conventional dyeing as it has been known for hundreds of years. Dyestuff manufacturers will continue to find new applications for this type of dye, will continue to improve methods of application and will continue to add even more products to this range.



### *precision chemistry*

... is the reason for the wide-spread growth and acceptance of Texize Chemicals for the textile industry. Texize has realized from the beginning the problem is not in the sizing but in the plant. Each plant differs; only the product uniquely suited to a particular plant will perform properly on the actual production line. And that product must be formulated precisely to meet all conditions, again and again. "Precision Chemistry" at Texize makes that possible.

**TEXIZE CHEMICALS, INC., Greenville, S. C.**

"Precision Chemistry" serves the industrial requirements of the textile industry for: Sizing Compounds, Softeners, Plasticizers, Defoamers, Resin Emulsions, Filling Conditioners.

# *Technical Library Promotes Progress At Callaway Mills Company*

A. U. Priester, Jr.  
Executive Vice President  
Callaway Mills Company  
LaGrange, Georgia

"How many stripes has a Bengal tiger?  
In what direction flows the Niger?  
What knock-kneed actress was born in Duluth?  
How many aches in an average tooth?  
How many uses can paper show  
Besides the kind that is used for 'dough'?  
Would yarn to clothe children sliding down chutes  
Wear longer than that in 'boot camp' boots?  
Or coming to duck and garbardine,  
Should the weaver of these be fat or lean?"

A technical library can't guarantee to answer all the above questions, but if instead of worrying about "tigers" and "teeth," you have a question concerning textiles, chemistry, or engineering, a technical library is a good place to begin looking for the answer.

It has been demonstrated over and over in the field of research that it saves both time and money to investigate what others have already done rather than take a chance of duplicating their work. One engineer recently was amazed to find that a "new idea" of his had already been patented in 1886. In all research the goal is knowledge—knowledge to use in solving problems. It matters little whether that knowledge is the result of research in the laboratory or in the library. If it can be found in the library, it is much less expensive. Realizing the wisdom of learn first what others have done, Callaway Mills Company organized its Technical Library in 1943 and since that time the scope of its services has continually broadened.

Callaway's Technical Library, located in the Research and Development Division, contains approximately 5000 volumes, as well as trade literature from various companies, a subject file of materials, a file of about 12,000 patents, and about 125 current periodicals. Indexes and card catalogs enable searchers to find what other people have already learned about the processing of nylon, the dyeing of Orlon, or whatever the specific problem may be. The library is staffed by a professional librarian and three assistants.

The library was enlarged and redecorated in 1958. The new area, which is almost half the size of the original library, provides additional space for shelving, files, card catalogs, and several tables and chairs. Varied colors—green, yellow, brown, persimmon, and gold—are used in the leather of the chairs. The window wall is a soft yellow, with cornice boards and the remaining walls a light green. Draperies in a modern design incorporate yellow, green, light blue, and gold on a white background. Plants, aquariums, and a large picture of lotus blossoms add to the attractiveness of the room. Air conditioning makes it comfortable.

Every company must have information materials. Pooling these resources in a centralized library eliminates wasteful duplication and makes the materials more readily available. Increasing use of the library is evident in the fact that in the last ten years, uses have multiplied more than 1800 per cent, many of the requests for information being made by phone. Some of the questions asked can be answered very quickly while others take hours of research. Subjects also cover a wide range. Here are a few selected at random from those handled by our Technical Library:

- Specifications for hydraulic brake hose
- Derivation and meaning of "pronto"
- Construction of tobacco cloth
- Methods of printing tufted carpets
- An introduction to patent law
- Employee testing programs
- Comparison of tape recorders
- Translation of a letter about a French loom
- Information about textiles for a science project  
(from a school child in Texas)
- Stainless steel versus other materials for dyeing equipment
- Methods of identifying fibers and dyestuffs
- Padding process for applying acrylonitrile
- Accepted basis for measuring labor turnover
- Staining technique for Gram negative bacteria





Cotton fever and its prevention  
Information on titanium sponge  
Bibliography on writing better business letters

In ancient times, it was possible for a man to master all the knowledge and be familiar with all the books of his age. In fact, even until three centuries ago a specialist could know all the significant books in his field and could read all the related journals. Today, however, with about 60 million pages of technical literature published annually, the only chance the scientist or engineer has to keep posted is by access to a good technical library.

Charles L. Bernier, associate editor of **Chemical Abstracts**, graphically describes the practical impossibility of the average businessman or specialist being able to read all that concerns his field of interest: "Today's scientific literature is so large, that one person can no longer read the output in one great branch of it, such as chemistry. If a chemist, who could read about 30 languages fluently, were to start reading in January all the papers of chemical interest which were published during that year, and if he were to read at the rate of four papers per hour and for forty hours per week, by the end of the first year, he would be more than ten years behind in his reading."

In addition to providing information for our scientists and engineers, we believe that all our executives need a broad background against which to make decisions. In order to keep all of these groups posted on current developments, our Technical Library prepares "Callaway Textile Abstracts" twice a month, each issue of which contains brief notes on some 150 magazine articles selected because of possible interest to Company personnel. This tailor-made abstract service is widely distributed within the Company not only to the offices and plants in Georgia but also to sales offices in New York and throughout the United States. Copies of complete articles are provided on request. The library also regularly routes periodicals to those wanting this service, as well as calling attention to items of possible interest. A weekly

Patent Report is prepared by the library for the scientists and engineers.

No library can have all the information a company needs, but librarians cooperate by making available to each other through interlibrary loan whatever publications may be needed. Our Technical Library has been a member of the Special Libraries Association since 1943 and is affiliated with the Georgia Chapter and with the Paper and Textiles Section. The organization, which celebrated its 50th Anniversary in 1959, is composed of librarians of business, professional, governmental, and industrial organizations and now numbers over 5000 members in the United States, Canada, and many other countries. Cooperation among members enables each librarian to have at his finger tips information in fields other than his own. Some businessmen tend to carry over a childhood conception of a library as one that provides recreational reading for women and children—a far cry from the modern company library. A special library, whether large or small, is built around the needs of a special group of people, and the modern technical librarian believes in the motto of the Special Libraries Association, "Putting Knowledge to Work."

Studies show that companies that depend on their libraries for information tend to show greater profits than other companies. Even browsing can be time well spent, for often a reader will come across vital information he is not even aware existed. Or, he may read today what he will happen to need tomorrow. Special libraries may not have any "whodunits" so that you can help track down the murderer, but if it is technical or specialized information you need, a technical library is a good place to begin sleuthing. You might be the detective to track down a way to improve present methods.

According to Bacon, "Knowledge is power," but unused power does not lead to progress, any more than books on the shelf lead to improved company operations. For this reason we encourage the use of our Technical Library so that it can do its full share of "Putting Knowledge to Work."

•  
**L. C. MARTIN**  
**DRUG COMPANY**  
  
**Clemson, S. C.**  
•

# Mechanical Doffer For Warper

By: Benny R. Phillips  
T.M. Class of '60

Louie King, Weaving Technician, at the Clemson Textile School has devised a mechanical doffer for the Crocker Warper Model SD40. The original doffing arrangement was a hand crank operating through a worm and worm gear.

## How it was Developed?

In the new mechanical doffer, power is obtained from a 1/3 horse-power, 550 volts, 1725 r.p.m. motor, equipped with a reversing switch. The r.p.m. to the worm is reduced to 84 r.p.m. by a "v" belt and pulleys. The reversing switch changes the direction of rotation for running or doffing.

The use of the belt drive makes it possible to operate the doffing arrangement without the use of limit switches as when the beam is at its extreme raised position. The belt connecting the pulleys slips preventing the motor from stalling. This slippage is made possible by the method of mounting the motor.

A motor mount was connected to the floor upon which the motor base was hinged on one side. On the other side a bolt was connected to the motor mount and placed through a hole in the motor base. A spring was placed on this bolt against the motor base and a nut was put on the bolt to hold the spring under tension. When the 15 inch pulley stops turning as the beam reaches the running position the motor pulley tries to climb the belt against the tension of the spring and the tension on the belt is lessened by the motor rising up, which allows the belt to slip on the motor pulley.

## Advantage and Approximate Cost

The new doffing device is a great labor saving device because with it there is no strenuous work as previously involved with the turning of the hand crank for raising and lowering of the section beam.

The approximate cost of installing this mechanical



Here Louie King is demonstrating the new mechanical doffer for the warper. (Photo by: B. R. P.)

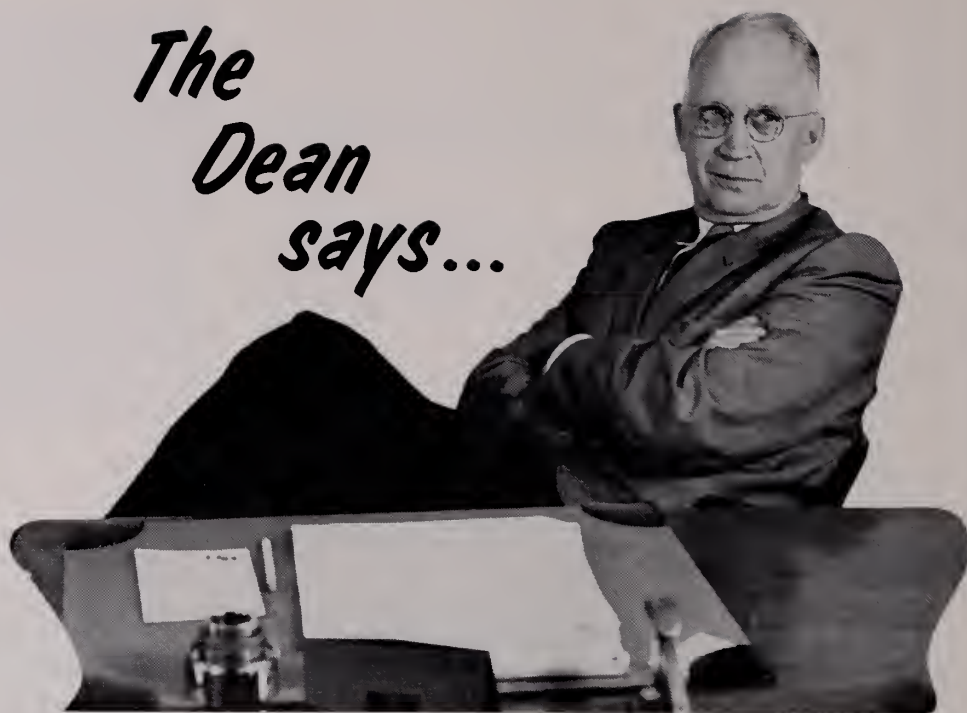
doffer, provided all parts have to be purchased new, would be about fifty dollars per warper, however, most mills probably have the needed supplies in their stock room, which are not being used.

## Another Development

The installation of an off-on switch, connected to the three brakes, at the base of the warper so as to be foot operated enabled all brakes except the beam brake to be on. The beam brake being off enabled the beam to be turned at the front of the warper as previously needed. This device enables one man to insert the beam locking pins at the front of the warper without a second person to depress the beam brake.



# *The Dean says...*



For the third summer the School of Textiles is offering a short course program for those in the Textile industry and related fields.

The first two courses, Yarn Manufacturing and Fabric Development, are especially recommended for the college graduates, other than textile school graduates who will enter the industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those entering a training program or for those going into the various staff fields. High school graduates will benefit.

**Living.** Those attending these courses can live in the college dormitories and eat in the college dining hall. If they live in the dormitories, they must furnish their own bed linen and towels. An electric fan would be desirable. Those who do not wish to live in the dormitories may make their own living arrangements. The Clemson House can accommodate those who wish to stay there. Some will wish to commute.

**Length.** Each course will last three weeks and will be a full time program. The lectures will be in the mornings and the afternoons will be occupied with laboratories or work in the library. If the need arises, courses will be repeated. There will be no classes on Friday afternoons or Saturday mornings.

**Cost.** The class fee is \$75.00 for each course. This will include the text book. Room and board in the college dormitories will be \$50.00 for each course.

**Registration.** It will be necessary to make ad-

vanced reservations for these classes. This is so that we may know for how many to prepare. Simply giving the applicant's name, course and sponsor will be sufficient. Payment may be made at the time of reporting. Checks should be made payable to The Clemson Agricultural College.

**Time of Reporting.** Students should report to the Dean's Office in the School of Textiles on the Monday morning that the course begins. If coming from a distance they may come in Sunday night. In that case they should report to the dormitory office and they will be taken care of for the night.

**Entrance Requirements and Credits.** There are no entrance examinations for any of these courses. A high school education is almost essential in all cases. There will be no college credit given for any of the courses. A certificate will be given each student who completes the course.

## **COURSES**

**Yarn Manufacturing**—Theory and Laboratory—Date Offered—June 13, 1960

This course is especially designed for students of two backgrounds. One is the college graduate, other than a textile school graduate, who has selected textiles as a career. The other is the high school boy who has simply gotten a job in the mill and has attracted the attention of management. The course is organized to teach those things least apt to be learned on a training program or by experience. It is ideal preparation for a training program.

**Fabric Development**—Theory and Laboratory—Date Offered—July 11, 1960

This course is designed for the same type students as the Yarn Manufacturing course. Ideally, it should follow that course.

**Supervisor Development** — Theory — Date Offered—June 13, 1960

This course is designed to serve both supervisors and potential supervisors, including general overseers. The subject matter will be general, not confined to any one field of textile operations.

**Quality Control**—Theory—Date Offered—August 15, 1960

Due to the ever-increasing use of Quality Control in industry, this course is designed to fill the gap for those who are involved in Quality Control work, but who have little or no formal training in Quality Control.

**Motion and Time Study**—Theory and Laboratory—Date Offered—July 11, 1960

A Motion and Time Study Course designed to give both the basic motion and time study principles plus the more recent techniques such as Work Sampling, Methods, Time Measurement, etc. This course is directed towards motion and time study as applied to the textile industry and consists of both theory classes in the morning and laboratory experiments in the afternoon. The course is particularly suited to those who have entered the standards department recently without proper training in the field.

**Cotton Classing**—Date Offered—June 13, 1960

This course will basically consist of cotton classing by the accepted rules and standards. The students will go over a representative number of samples, followed by the instructor who will class the samples and explain points of difference.

The course will include lectures by personnel of the School of Textiles and others on cotton markets, harvesting and ginning questions, fiber quality as to character and related matters.

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# Outstanding Seniors . . .



**CHARLES C. BAGWELL**

Charles C. Bagwell is a Textile Engineering Major from Columbus, Ga. He has been an honor student at Clemson for four of the six semesters that he has attended school. He has spent three of his summers working in the textile industry. He has been employed by Muscogee Manufacturing Co., for these three summers.

Charles is in the Army ROTC where he is the company commander of company C-2. He is also a Hall Counselor, member of the N.T.M.S., Treasurer of the Phi Psi, and Business Manager of the Bobbin and Beaker.

Upon graduation from Clemson, Charles hopes to enroll in the Institute of Textile Technology, located in Charlottesville, Va. There he will further his education in the textile field, and upon graduation he will enter the textile industry.

**FRANK McGUIRE**

Frank McGuire is a Textile Management major from Laurinburg, N. C. He has spent two of his summers working with two different textile industries gaining a great deal of experience in textiles. In 1958 Frank spent the summer working for Morgan Cotton Mills, Inc., in Laurinburg. In 1959 he went into the training



program that Burlington provides for college students. He worked in the Pacific Mills plant located in Raeford, N. C.

Frank was an honor student the first semester of his junior year. He is an attorney for the Senior Council, Senior Warden of the Phi Psi, member of the N.T.M.S., and a member of the Clemson Tiger basketball team. Frank's ability to play basketball has earned him a full four-year scholarship. Frank is also a Cadet Lieutenant in the Army ROTC, and he will go in to the army upon graduation from Clemson.

**DON FAILE**

Don Faile is a Textile Manufacturing major from Kershaw, S. C. Don is single and lives in the dormitories here at Clemson. Don was an honor student his fifth and sixth semesters here at Clemson. He has spent two summers gaining valuable experience in the textile industry by working with Springs Cotton Mills.

Don is a member of the advanced Army ROTC program, member of the Phi Psi, member of the N.T.M.S., and also a member of the SAM.

This year Don was the recipient of the David Jennings Memorial Scholarship. Don plans to enter the textile industry as soon as he can fulfill his military obligation.



# Loom Reeds Now and Then

By

S. Fuller McLane, Sr., General Manager  
Southern Loom-Reed Mfg. Co., Inc.  
Gaffney, South Carolina

Did you know:

A Textile is a woven fabric. The name comes from the Latin word *texere*, meaning to weave.

The oldest traces of weaving ever found are bits of flax and flax yarn in the remains of the Swiss lake dwellings during the New Stone Age.

The earliest actual textiles found in the tombs of ancient Egypt were of linen cloth. Mummy cloth dating from 2500 B. C. contained 540 warp threads to the inch. Mummy cloths discovered measured five feet wide and sixty feet long. Egyptians were highly skilled weavers as long ago as 4,000 years before Christ.

Cotton was known in India as early as 800 B. C. The Egyptians were weaving cloth of cotton before that period. Cotton, however, did not become commercially important until the time of Christ.

Through the centuries the development of reeds, essential for weaving cloth, has been instrumental in the progress of the textile industry. Southern Loom-Reed is the proud possessor of a hand-made reed which is over one hundred and fifty years old. The construction of this reed is similar to the present day pitch-band type reed. Instead of wire to form the dents they used small splits of reed (cane) cut out and smoothed for this purpose, thus the names reeds and splits, which are used to-day.

Although the reed industry of America is considered modern to-day, it seems that we are still rather new in the business.

We would like for you to take a written tour through our plant to better understand the procedure involved in present day reed making. We have been in business thirty-five years, producing various products for use in all types of textile plants.

Loom reeds being our foremost product we have naturally spent years of study and research in methods for better construction and finish for our trade name REAL REEDS in both pitch band and all metal.

Nothing but the highest grades of materials obtainable is purchased for Real Reeds. The main item is a special round wire for reeds. Many sizes of wire are required to maintain the desired thickness and widths after the wire is rolled. Each piece of wire is rolled from five to eight times through water cooled rolls. This cooling system is used to keep the rolls at an even temperature so they will not heat and expand. Expansion would cause the wire to vary in thickness. By use of this method we are able to hold the correct gauge to plus or minus .0001".

After rolling the wire, it is now ready to be placed on special built wire polishing frames where the wire passes through various tools designed and made in our plant for our exclusive use. There are no set rules as to how many times the wire is run through the various processes. This wire remains on the frames until the desired finish is obtained. The tools are used in the following sequence: a flat straightener is used to straighten the wire flat-wise, an edge straightener is used to straighten the wire edge-wise, special carbide cutters are used on the edges of the wire to obtain a smooth edge and to correct width, and at this point the wire is left with perfectly square edges. A concave gouge tool is now used in putting the edges of the wire back into a round shape again. Next the wire is placed in a special filing block, passing through a series of twenty files, ten of right hand cut and ten of left hand cut. In this tool the wire at first runs lying flat and then is turned at various angles so that when it is finished in the files the edges are smooth and round. The final finished polish is done in the emery board, where a fine emery cloth is set to contact the wire at every angle as well as the flat surface of the wire. It is then thoroughly cleaned, wound on pressed steel rims, and placed in storage for future use.

The following widths of finished wire are stocked by us at all times: .105, .125, .150, .175, .250, .312, .375,

(Continued on page 19)



# RESEARCH DEVELOPMENT PROGRAMS

By: Sydney M. Cone, Jr.

We have been interested in the efforts that are going on to expand research and make it more effective in our industry. It might be of interest to your readers to attempt to survey the various programs now going on under the general title of "Research". The government programs slanted toward textiles would begin with the Department of Agriculture programs. These are stimulated by the Department's interest in the cotton crop. They extend to by-products of cotton. The off-shore program managed from Rome, Italy involves technical research in the countries of Finland, England, France, Spain, Italy and Israel. This uses their facilities and their currency. The government-sponsored research extends all the way from the cotton plant to the Atomic Energy Commission's interest in the effect of radiation on fibers.

Private research facilities, privately owned and with the profit motive, have been able to merchandise many profitable programs to government and to industry. Joint projects, such as the Textile Research Institute at Princeton, New Jersey and the Institute of Textile Technology at Charlottesville, Virginia are supported by private companies, but not for profit. Their programs are aimed at very specific technical problems of their memberships. The big business corporations maintain private research facilities for profit. Some of these are more successful. Sometimes you start with a consumer need, and sometimes you have to use promotion methods to persuade the consumer of his need. The corporation research must be backed by a willingness to spend money on plant and machinery in order to cash the products of the researcher.

Tying together in a very loose way these various unrelated efforts, you will find the personnel that is involved in the laboratories, the manufacturing, and the merchandising. This personnel takes memberships in the American Chemical Society, in the American Association of Textile Chemists and Colorists, American Society Quality Control, and an assortment of similar groups. Technical seminars, social meetings, publications and visits keep these individuals in touch with each other and with the general flow of knowledge in their specialties.

It is easy for the expert to get lost in this maze. From time to time, study committees are set up to

attempt to bring more order into an apparent chaos. These research efforts and organizations have been growing right fast and sometimes they outgrow the organizational pattern that was suitable for the smaller group and less suitable for the larger one. Their interests expand. Textile companies have now to evaluate the word "Nonwoven". Will Nonwovens bridge the gap between the paper mill and the loom? Will extruded threads eliminate the spinning frame? The technical knowledge of the spinner may have to be expanded to a new dimension.

It is an interesting study to try to fit together the research components and to see where they have their own fields of study and interest, and to what extent each research program overlaps the program of another.

After a certain degree of knowledge of the entire research picture has been achieved, the student of this picture could sit down and lay out an effective research organization for a particular mill or manufacturing corporation. The problems to be submitted to the research organization would exclude the day-by-day technical production control. It would include special problems that production might encounter. The student would want to give consideration to such questions as:

1. How far beyond special problems do you want your research team to probe? Do you want it to create new products?
2. How do you propose to finance the operation? The method of financing will have an effect on the freedom of action of the research executives.
3. Are you going to maintain a patent and licensing service?
4. Are you going to use some existing facilities outside your company to attack special problems for you? This is especially necessary when expensive equipment is needed for the particular study.
5. What educational and training facilities will your research group attempt to supply to your company?
6. Will your research group undertake to maintain membership and attendance in national societies, technical schools, libraries?

7. What specific facilities are you going to need to develop your research program? What laboratories? What Pilot Plants? What testing apparatus?
8. How are you going to evaluate the production of the research group?
9. You will need to have a close correlation with production and with merchandising, and the method of establishing this correlation is another study in itself.

Now that the word "Research" is on everybody's lips, it behooves the student to define the word in understandable terms. This little essay is such an attempt. It has tried to provide some perspective and to indicate areas that the student might well investigate further.

## LOOM REEDS

(Continued from page 17)

.500, .625, and .750". All of these widths are in various gauges as to thickness so as to get the correct amount of air space in any dent per inch reed. The shape of this wire is both oval and semi-oval. It is also in both carbon and tempered stock for reeds that require wire of this type.

A smooth high grade yarn is used based on 30's single knitting twist. A certain number of ends are twisted together according to the dents per inch in the reed to be made. A special mixture of tar and pitch is combined and heated in a steam jacket pot to correct temperature. The use of steam by us is to prevent any chance of burning the mixture in which the band is being impregnated.

We are now ready for the finished wire and band to go to the reed setting machine along with the bass wood ribs which form the frame of reed. Since the actual operation and setting of the reed machine would be rather complicated to explain in writing, we will give you only one feature which we have proven is better in it's use on this machine. It is necessary to have heat on the reed machines to soften the tar and pitch treated band as it wraps around the ribs and between the dents. An open type gas burner is the conventional type heat used. Thirty years ago we developed an electric heating arrangement for this purpose giving more uniform heat and a smoother set reed.

After the reeds are made they first go through a very rigid inspection for flaws of any nature. The caps and headings are now put on, the headings of a reed are of utmost importance, and for that reason we have developed two different type end bars, both of which give additional strength to the reeds along

with several other features. One type of these end bars has been on the market for fifteen years. After several years of testing, our latest type was put into use in 1958, the feature of this one being that the outer edge of the end bars is beveled allowing the shuttle to make a smoother and more uniform contact on the reed when the shuttle is picked from the box, causing less wear on both the shuttle and the reed. After the caps and headings are put on, then the comb of the reed is clinched down smooth.

The reeds are now ready for the finishers. Their job is to see that the dents of the reed are straight, level, and uniformly spaced. The reed is then passed on to a hand polishing process. All Real Reeds are finished as to polish and not ground with an emery belt after they are made. The hand polishing is an added cost to us, but it assures the customer of a smoother reed for both warp and shuttle.

The reed is now ready for the paper or mystic tape to be glued on the backs of the reed. If paper is used, the reeds are placed in a drying cabinet to set the special type glue that we use.

The reeds are thoroughly cleaned and brushed with a series of nylon bristle brushes. A final inspection is made before they are packed for shipment.

We are questioned quite often as to what dent reed is used by most mills on certain constructions. It might be of interest to know what a wide variety of specifications we have made reeds by over the past years, taking an 80 X 80 construction as an example. The following is a range of dents per inch used in the various reeds for this:

36.96 dents per inch, 37.04 dents per inch, 37.18 dents per inch, 37.20 dents per inch, 37.27 dents per inch, 37.30 dents per inch, 37.40 dents per inch, 37.50 dents per inch, also on up to 38.00 dents per inch. Also a range of sizes of wire used .010, .011, .012, .0125 in thickness, and .105, .125 and .150 in wire widths. A similar variation applies to most all constructions. So there is certainly no such thing as a standard for any one style.

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GREENVILLE, S. C.



# WILDMAN JACQUARD "HI-PILE" KNITTING MACHINE

The Wildman Jacquard "Hi-Pile" knitting machines have been in existence for a number of years with the main production emphasis on "imitation fur" fabrics. Many mill people fail to realize that these machines produce salable fabrics other than "imitation furs." In addition to the many forms of innerlinings for outerwear garments and shoes there are paint rollers, buffing cloths, toy coverings, rugs, mats, carpeting, and decorator fabrics, to mention only a few of the many end uses for this versatile fabric. However the fabric that has been most neglected in recent years has been "Hi-Pile" fabric itself. Not "imitation fur" but rather a tastefully styled reasonably priced "Hi-Pile" outerwear or decorator fabric in a rainbow range of colors that has the creativeness and the practical qualities to attract the consumers.

Recently the Wildman Jacquard Company has developed an automatic two color mechanism for use on their "Hi-Pile" knitting machines which enables the knitter to produce any number of horizontal stripes of different colors in any desired width of stripe. In combination with this striping mechanism "trick" wheels may be used to produce various vertical patterns at the same time or separately as required. A control chain with high and low links may be set up to change colors as desired. The trick wheels may also be set up to select as many or as few needles as is required to obtain the desired color pattern effect. This is a relatively new development in the High Pile field and not too much has been done up to the present in marketing mixed colors or color patterned "Hi Pile" fabrics. This of course leaves the field wide open for creative designing of new "Hi Pile" fabrics with added consumer appeal.

Knit pile fabrics offer many advantages over other forms of pile fabrics and give the designer a decided freedom when considering "new" fabrics. First a real dollars and cents saving of raw material (i.e. card sliver as opposed to the more expensive yarn) for the economy minded firms. Secondly, a deeper, denser, pile with the superior draping qualities that are necessary to avoid the "too bulky" look so unflattering to most consumers. The Wildman Jacquard Co., uses a directed air stream to assist the card doffer roll to place the sliver staple in a "U" around each needle. This method forces the staple to the face side of the "pile" (preventing the unnecessary knitting in of the staple with the backing yarn) and allows the backing yarn to firmly anchor the staple at the bottom of the "U". This method prevents the backing from becoming bulky and at

the same time provides maximum pile coverage on the face of the fabric. Thirdly, the comparatively (for the same end use) lighter weight of the finished fabric.

In order to improve the operation of their "Hi Pile" knitting machine, the Wildman Jacquard Co. have recently developed a new low pressure air system which can be used with their machines eliminating the necessity for the mill owner to supply an outside high pressure air supply. This new low pressure system has several advantages over the high pressure system in that it supplies much cleaner air without the oil and water condensation usually found in high pressure systems. It also is much quieter in operation and cheaper to maintain, providing a worthwhile over-all savings in air supply costs.

By careful selection of the sliver staple length (i.e. from 3/4" to 3" length for synthetic fibers and from 3/4" to 6" for natural fibers) real economy can be realized in the shearing operations. In addition to the savings, the designer is left free to create effects by mixing long and short staple lengths and/or mixed color staple in the sliver. He can also select sliver weights from 50 to 300 grains per yard and fiber from 1 1/2 to 15 denier. By mixing the denier of the fiber various effects can be obtained or by mixing synthetic fibers of different shrinkage qualities still other fabric effects can be produced. Heavier and lighter type fabric backing can be made by choosing the cut or number of needles in the machine (from 6 cut to 16 cut) or by varying the count of the backing yarn.

The backing yarns used would depend on the end use of the finished fabric and the method used in finishing. The type of backing yarn used also depends on the methods used in setting the fabric. Where heat setting is used a dynel type of yarn is used to take advantage of the shrink characteristic. Where latex is used, a cheaper cotton yarn is satisfactory. Various other color effects in the finished fabric have also been produced by mixing natural (i.e. undyed) fibers with different dye absorption rates. All of these possibilities have been tried at various times but the vast end use potential of these new and different fabrics has been barely touched.

Most all synthetic Hi Pile fabrics are resistant to stains and in addition, they give excellent wearing qualities and are moth proof. All of these features have a built-in consumer sales appeal to help the designer and the mill owner create "Hi Pile" fabrics of beauty, utility and salability.

# The Market Potential For Polyolefin Fibers

Victor L. Erlich  
Reeves Brothers, Inc.

Among the new textile fibers, this group is the newest one at present and you probably have guessed what I am writing about; I mean the Polyolefins or "Olefins" as recently designated by the Federal Trade Commission.

It was reasonable—I think—not to put the polyolefins on the same level with the Polyamids, Acrylics and Polyesters. The latter have been introduced twenty or ten years ago and all of them have found their fields of application specifically or in competition with each other, and this in the order of magnitude of hundreds of millions of pounds per year. Therefore ample experience exists for extra-polation into the further development of their respective markets.

Not so for the Polyolefins or—for the time being—more specifically for the Polypropylene fibers. The term polyolefins comprises the commercial older and new types of polyethylene, and polypropylene. Other polyolefins are still laboratory curiosities, but one or the other may emerge ready for the industry.

Polyethylene in form of filaments has been used in small quantities for about ten years. When the new linear polyethylene was offered by 1957, it became possible to manufacture filaments which in strength were comparable to nylon; and in 1958 polypropylene made its appearance as a competitor. These fibers were produced in the form of comparatively heavy monofilaments which established their market primarily for strong ropes and for a variety of industrial fabrics, woven or braided. Such filaments in their diameter range of between 20 down to say 5 thousandths of an inch or in denier from 2,000 to not much less than 150 are much too stiff to serve as a textile material, in the broad sense. Many industrial applications require soft and pliable fabrics, and if we venture into the garment field the denier of the fiber does not exceed 20 but normally ranges around 3, 2 and 1 denier. This means the diameter of the individual fiber will be below 2 thousandths of an inch, used in form of multifilament or spun yarn.

Methods of production as well as of commercial application of these fine fibers are clearly distinct from those of the heavy polyolefin filaments. The

latter are already established in their market with a yearly consumption of between one and two million pounds per year; an increase by several more millions can be expected particularly if polypropylene can widen its foothold especially in the seat cover field. Such quantities, however, remain rather insignificant in the light of a yearly production capacity in U. S. which may reach 2 billion pounds of polyolefin polymers in the next years.

**Fine Fibers of Polypropylene are just emerging from the first production lines** and sizable quantities of these fibers will become available during 1960 from several sources here and abroad (Italy, England, Germany, perhaps France). As per today, production figures up to ten million pounds per year have been announced for these fibers but quite some time will be needed to have an actual response of the market. Therefore it is still premature to make predictions even with regard to the order of magnitude of either tens or of hundreds of millions of pounds.

There is no doubt that the fine polypropylene fibers will find their place in certain applications especially industrial ones where such a fiber has advantages in view of chemical and other properties. This has been discussed in papers published in "Modern Textiles Magazine", November 1958, and another one published this month in Textile Research Journal.

Essentially it can be said that the polypropylene fiber ranges among the high tenacity fiber. It has good resilience, this means it is a lively fiber, which can be processed on regular textile machinery as such and in blends with others, natural or synthetics. The softening point, this means the upper temperature limit for practical application is lower than that of nylon or Dacron but better than that of polyethylene or vinyls, this may not be a serious handicap even for apparel use, because every housewife is now-a-days acquainted with low temperature ironing of the "no ironing" label. On the other hand, it is now established that well processed fibers can be exposed to temperatures as low as  $-70^{\circ}\text{C}$  ( $-94^{\circ}$ ) without damage. Dyeability and outdoor weather resistance of the fine fibers were and are other problems of experimental work for which good progress can be reported. Continuing development on the en-

Paper presented before the "Chemical Market Research Association", Williamsburg, Va., September 22, 1959.



tire front including the structure of the polymer itself is so to say unavoidable in view of the work done not only by those who are already in the polypropylene field but also by many others who are just playing with the idea.

Adjusting the properties of a new fiber to the enduses is the pre-condition which determines the scope of its future market, this means whether this market will remain limited or become a broad one. But what finally throws the balance, is the economic position, with other words, the **cost and subsequently the market price of the new fiber** in comparison with the established ones.

Cost of production from the polymer to the fiber, is about the same for any type of full synthetic fiber when compared under similar conditions of production to either staple or multifilament yarn. Differential cost of the fiber depends therefore on that of the polymer and its specific gravity which determines the yield of fiber per pound of resin.

In our case the basic raw materials are the simplest olefins, ethylene or propylene, which are supplied from the refineries of natural or cracked petroleum gas. They are the building stones of the tremendous petrochemical industry which accounts now for approximately one third of the total chemical output and perhaps three fourths of the synthetic organic chemicals in U. S. Purified ethylene ranges in cost between 2½ and 4¢ per pound; propylene may be somewhat higher in cost, in U. S., or lower, in Europe, depending on location and accounting-system of the refinery. The ratio of propylene to ethylene to be obtained also can be controlled, at least to a certain degree.

Their straight polymers, polyethylene or polypropylene, should therefore be the most economical ones to produce, on paper at least. Indeed when polypropylene will be in firmly established and competitive full production, the price of this resin should come down from its present level of 42¢ to that of polyethylene, this means to 35¢ and less, perhaps to 30¢. Such level will be below that of most or all of the fiber-forming synthetic polymers, and will be hard to beat.

On top of this, the specific gravity of:

0.90 to 0.91 for the polypropylene fiber compares with

1.14 for nylons 6/6 and 6

1.14 to 1.19 for Acrylics

1.22 to 1.38 for Polyesters

and the yields per pound of the same size of yarn are in accordance between 20 and 35% better than for the synthetics established in the textile field. This would assure a good competitive position even on the same Dollar per Pound basis.

This being established, **what could be the broad**

**market** potentials, this means the jump from a ten million to the hundred million level per year? Obviously this can be expected only if the textile industry including the garment manufacturers will have an interest to use the polyolefin fiber for certain of their lines.

As a full synthetic fiber, polypropylene will have to be accepted as such, not necessarily in competition but in addition to those which exist, and such a place is wide open indeed.

In the overall textile fiber picture, we have to distinguish the positions in U. S. and those outside.

While we have a total per capita consumption of 35 lbs. per year, only 8 pounds are an average for the world outside which includes Canada and those Western European and a few other nations which have a per capita consumption of between 20 and 30 lbs.

In the States approximately 3 to 3¼ lbs. full synthetics are now consumed per capita and year, or approximately 9% of the total fiber use. These very last years have shown that the natural fibers, cotton in particular, and the broadening group of the regenerated cellulosic fibers are putting up a hard and not unsuccessful fight against the inroad of the synthetics. Actually the synthetics had quite a beneficial effect on the older fibers which show that they can improve their properties while maintaining their popularity of thousands of years. But both are learning how to live together, and therefore the synthetics will grow proportionately and with the growth of the population. This growth alone adds a requirement of about 100 million of total fibers per year.

Outside U. S. and quite particularly for the so-called under-developed countries, the increase in the per capita consumption will present a greater challenge to the textile supply than the growth of the population. In the long run, it will become more and more difficult for the natural fibers, cotton and wool, to meet this challenge. At present they cover approximately 80% of the world total fiber requirement of 30 billion pounds per year, and an increase of only one pound per capita means an additional need of 3 billion pounds per year against half a billion due to the yearly increase of the world population at the present per capita consumption. Consequently a steadily increasing portion of these additions will have to fall in the lap of the man-made fiber industry, first of the regenerated cellulose and then more and more of the full synthetics. Considering that these synthetics now supply less than half a billion or say 0.2 lbs. per capita outside U. S. against the three lbs. in U. S. we see the disproportion and the conclusion to be drawn.

This obviously will be to the benefit of the entire

(Continued on page 24)

# ALLIED CHEMICAL POINTED THE WAY TO TEXTURED FILAMENT NYLON IN HOME FURNISHINGS

The big breakthrough in the evolvement of carpets made of textured filament nylon came in 1958 when a lone carpet manufacturer quietly showed an experimental cut-pile number to a few knowing retailers and distributors at the June market. The significance of the new development may be measured by the fact that eight textured filament nylon qualities were offered to retailers and distributors by no less than four important carpet makers at the January market in 1959.

From the beginning, Allied Chemical's textile experts were intrigued with the idea that pre-shaped filament nylon might well result in a completely new kind of floor covering which could set standards of performance never before obtained by the industry. The advantage of using a filament nylon over a spun nylon in carpeting, Allied Chemical experts realized, was the elimination of pilling and fiber migration, long a problem in nylon carpets due to the strength of the nylon yarn. If a filament nylon could be used in the place of spun nylon in carpets, upholstery—and other fabrics where pilling and fiber migration became a problem—it might be possible to open up a whole new field in carpet styling, backed by superb performance.

Allied Chemical took the first step in 1955 when it successfully introduced a completely new class of durable textile materials called Caprolan heavy yarns. Large supply packages, a parallel arrangement of filaments, a degree of dyeability not previously attained in high tenacity nylon and a ready degree of workability with heat provided a yarn that was ideal for texturization and for use in all kinds of home furnishings fabrics.

Since that time Allied has maintained a persistent program of cooperation and guided exploration designed to induce texturizers and textile manufactur-

ers to unleash their imaginations and capitalize upon the limitless potentials made possible in the home furnishings field by the inherent properties of Caprolan heavy yarns.

Allied, in order to assist its customers, wholeheartedly offered the resources of its new Fiber Application Laboratory, opened two years ago adjacent to the Caprolan spinning plant near Hopewell, Va. The know-how of its end-use development staff as well as its fiber application specialists was made available to firms interested in originating texturing developments.

Carpet firms particularly realized the potentials of textured filament yarns and initiated long range schedules of experiments based on this new concept. The first notable success was the commercial production and introduction of Croft Carpet Mills' "Resort" collection of carpets made with Textured Caprolan pile yarns based on multi-process yarns developed by Leon-Ferenbach Company. The pile yarns, which incorporate more than one type of texturization in a single Caprolan yarn, offered a new degree of bloom and cover in carpet yarn and made it possible for Croft to create a significantly new type of cut-pile texture which was easier to clean, unsurpassed for resilience, unexcelled for wear and would not shed, pill or fuzz.

This new and different kind of functional carpet was introduced to the public in the Fall of 1958 by such leading retailers as W. & J. Sloane of New York, Rich's of Atlanta, Miami Rug Company of Miami, Marshall Field & Company of Chicago, Jerry Miller Carpets, Inc., of Indianapolis, Suniland Furniture Company of Houston, Meier & Frank Company of Portland, Oregon, Zandt Carpet Company of Hollywood, and Rounds of Pasadena.

Allied Chemical has instituted a "Certification of



Performance" program by which carpets may qualify for marketing under the "Textured Caprolan" label. Basically, the program approaches the carpet on the basis of what it will do for the consumer. Furniture marks must disappear, colors must meet strict minimum standards, texture must be retained after traffic and after professional cleaning, the fiber must not shed, and soil and stains must easily be removed by simple procedures.

Carpets of Textured Caprolan not only perform well but are of significantly greater value than carpets of other fibers offered in the same range. The excellent resilience and covering power of Textured Caprolan make it unnecessary for the manufacturer to overload his product with pile yarns in order to achieve satisfactory performance levels. Experience has already indicated to carpet manufacturers a new high level of manufacturing efficiency with machines operating well over 90% of shift time.

Spurred by the joint achievement of Allied Chemical, Leon-Ferenbach and Croft, other fiber manufacturers have accelerated programs to introduce textured filament nylons of their own. In addition, practically all yarn preparation mills are developing texturization techniques of their own—as are a number of fabric manufacturers. The opportunity for new products in closely connected fields, such as upholstery and draperies, already has been exploited. For example, Collins & Aikman have successfully marketed two highly acceptable upholstery fabrics of Textured Caprolan. In addition, other types of textured nylon have been developed for use in transportation fabrics.

There has been some adaptation of textured yarns in industrial fabrics also. Some work has been successfully completed on the development of rope for use in mooring dirigibles. In addition, shoe threads have proved to be a successful application of Textured Caprolan yarns.

The textile industry also is utilizing untextured Caprolan heavy yarns in such end-uses as upholstery; cordage, both laid and braided; shoe thread—much of which is hot-stretched and/or bonded; fire hose; and webbings.

Allied's pioneering program — in conjunction with independent texturizers and fabric manufacturers—has done much to stimulate the industry and encourage technologists to develop their own ideas for the texturization of Caprolan heavy yarns and for their application in a variety of experimental fabrics. The reception of Textured Caprolan yarns by carpet manufacturers in the Winter markets of 1959 and the greatly increased effort by yarn processors, other fiber producers and fabric manufacturers, is a small but significant indication of what these new materials hold for the future.

## **POLYOLEFIN FIBERS**

(Continued from page 22)

synthetic fiber industry, but it also is an illustration for the margin which is available for a new fiber which is able to fill at least certain sections of the market and which can be supplied at comparatively low price. Practical experience is much too limited today to permit predictions but in our mind this is the case for the polypropylene fiber and perhaps even more so for its future industrial relatives. Such relatives can be expected because the polyolefins are a classical example how to build chemical structures of fiber forming polymers with properties which can be adjusted tailor-made to meet the diversified requirements of the textile markets.

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## **Optimism Hinges On Government Action**

By

**James A. Chapman**

**President of Inman Mills, Inman S. C.**

Textile industry optimism hinging on possible government action on imports and other problems was voiced by the titular head of the industry.

James A. Chapman, president of Inman Mills at Inman, S. C., and president of the American Cotton Manufacturers Institute, representing the cotton, man-made fibers and silk segments of the industry, said:

"The year for textiles has been marked by improvement along several lines and the emergence of a growing awareness by our government of some of the many problems peculiar to the textile industry.

"Leadership of the industry as a whole is much more optimistic than a year ago, but whether this optimism is justified will depend on whether our government changes its policies regarding the textile industry, particularly as to imports and the two-price cotton system.

"Recently, President Eisenhower, acting on recommendation of Secretary of Agriculture Benson, directed the Tariff Commission to make an investigation of the imports of cotton textiles pursuant to Section 22 of the Agricultural Adjustment Act as amended. We expect this investigation to show that relief from imports is necessary for the continued health of our textile industry. Although the announcement of the investigation seems to have been directed specifically at the present system, whereby foreign

mills buy American cotton eight cents a pound cheaper than our mills can buy it, it is hoped the hearings will be broadened in scope to include the wage differential between our industry and the textile industries of other nations, as well as other factors. We intend to make a strong presentation at the hearing, scheduled to start March 1, with the hope that the entire imports problem can be examined and dealt with.

"In the past year, we have seen mill inventories decrease steadily, while unfilled orders increased; the price structure of the industry improved; production levels rose somewhat; overall employment in the textile industry increased and the profit position has improved, although textile profits this year were still only slightly over half the average of all manufacturing.

"We must remember that 1958 was a very bad year and we had nowhere to go but go up, and the American Textile industry still is below the levels of 1952 and 1953 in cotton consumption, while manufacturing margins and employment are far below the 1949-1954 levels.

"We have seen rising imports and falling exports during the year. There has been a sharp increase in imports of cotton textiles from Hong Kong, India, Pakistan and other countries during the year; also, imports of man-made fiber fabrics have risen steadily and dangerously. Government figures show that since 1954 imports of textile manufacturers have exceeded exports. Actually, imports for the first half of 1959 came in at an annual rate of 170 per cent of exports.

"Generally, we face the New Year with hope and with confidence, as we believe that the Tariff Commission has all the facts about imports, the necessary action will be taken to correct the unfair competitive conditions under which we have been trying to exist."

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## Cotton Farmer Asked To Help

President J. Craig Smith of Avondale Mills, Sylacauga, Ala., recently appealed to Alabama cotton farmers for support of the textile industry's efforts to ease what he termed the "unfair situation" caused by imports from low-wage countries and cheaper cotton prices for foreign textile manufacturers.

"We don't think it is fair and equal treatment to permit our foreign competition to pay as little as 10 cents an hour and undersell us in our own country," Mr. Smith said at a Cotton Improvement Awards Meeting in Tuscaloosa County, Alabama.

He also said, "We don't think it is fair and equal treatment to require us to pay the government sup-

port price for our cotton and for our own Government to sell similar cotton to our foreign competitor at a 25 per cent discount, and then permit our foreign competitor to take our home market purely because of his cheap cotton and labor.

"So far as I am concerned, if the Government would levy a tariff on foreign textiles which would have the effect of getting their labor cost up to \$1.00 an hour and getting their cotton up to the price we are required by law to pay, I would be willing to take our chances in holding a highly competitive market.

"I don't believe the foreigner can take this market if he has to observe the same legal ground rules that we do."

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## Cloth Imports At Record Level

Imports of foreign-made cotton cloth reached an all-time high during 1959, according to yearly figures recently released by the U. S. Department of Commerce.

The government figures show that a total of 240,765,000 square yards of cotton cloth was imported from foreign countries in 1959. That total is nearly 100,000,000 square yards more than was shipped into the United States during 1958.

In addition to the cotton cloth, the Department of Commerce said foreign companies sold \$150,400,000 worth of other cotton goods in the United States during 1959. That total is more than \$38,000,000 over 1958 sales figures.

Total value of all cotton cloth and other cotton goods imported from foreign countries during 1959 was \$202,300,000. In 1958, shipments of similar foreign-made items were valued at \$150,100,000.

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## Getting More Help

The textile industry is gradually getting more support in its fight to save the jobs of American textile mill employees from foreign imports.

Just recently, members of the U. S. Commerce Department's Textile Advisory Committee passed a resolution urging quotas on imports of all textile products from overseas. This would mean that no country could flood the United States textile market with goods produced at slave labor wage rates and which would undersell goods produced in our own mills.

More newspaper editors now are supporting our position.

It has been a tough fight and it will continue to be a tough fight, and we need the help of everybody if we are to save our mills and jobs.



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*—Edgar Lee Masters*

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